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(54) **Preservative treatment of  
timber in installed windows and the  
like**

(57) A method for protective  
treatment of timber in existing  
constructions such as installed  
window frames and door frames. The  
intention of the treatment method is  
to protect timber exposed to fungal  
decay, or already decayed timber, for  
longer periods of time by supplying a

wood preservative and by eliminating  
and preventing climatic conditions  
which further the growth of rot.  
According to the method holes are  
formed in the wood and a wood  
preservative is supplied to the wood  
via these, preferably by injection under  
pressure. The holes are left open when  
the preservative has been applied and  
an efficient release of moisture is  
obtained hereby. The treated parts are  
then covered with mouldings or  
profiles, preferably of plastic material.

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## SPECIFICATION

**Preservative treatment of timber in installed windows and the like**

The present invention relates to a method for preservative treatment of timber in existing constructions, e.g. installed window jambs and door frames. The invention relates to a method for remedial/reconditioning treatment of decayed or poorly protected timber in such constructions and the method comprises forming cavities in the parts concerned, applying a wood preservative in the timber through the cavities and covering of the thus treated parts with mouldings or profiles.

In the last few years the problem of fungal decay in installed window joinery has been recognised in Sweden and other countries. These problems originate from the fact that the timber in the constructions was not protected against rot originally or that the protection was inferior. The problems have become so serious that measures must be taken promptly. The most drastic measure, replacing the damaged material, is too expensive to be used for more than a minor part of the total. Decay of timber due to rot is dependent on moisture and rot does not normally attack timber having a moisture content below about 20%. Timber in installed constructions such as doors and windows are exposed to attacks from rot during great parts of the year since it is exposed to moisture both from the inside air and the outside air. Rain water is of great importance for moistening the wood.

For a couple of years now attempts have been made, both with methods and agents, to prevent attacks in particularly exposed constructions or to prolong the lifetime of constructions already subject to fungal decay.

The methods which have been used till now are based on injection of preservative agents under pressure or on a diffusion treatment. In both methods holes are drilled close to the decayed or exposed parts and the preservative is then deposited in the holes. At the pressure-injection method the preservative is injected into the timber for an appropriate time and the hole is then plugged up. At the diffusion method the preservative agent is inserted in the whole, e.g. in an ampoule or a tablet and is slowly released into the timber and the hole is plugged. Final treatment, e.g. painting, puttying or other covering treatment, of the parts treated with preservative can then be carried out.

Organotin compounds such as TBTO and TBTN (tributyltin oxide and tributyltin naphthenate) are widely used for impregnation of window joinery and have also been used in the above described pressure-injection remedial treatment. These agents are oil soluble and are usually applied from a solution in white spirit. The agents have certain disadvantages as concerns fire hazards, smell, and bleeding of white spirit from the treated material.

The diffusion method is fundamentally based on a high moisture content in the wood for diffusion of the preservative agent to a sufficient

65 extent. The water soluble agents which hitherto have been used for this purpose, boric acid/borax and bifluorides, have certainly been satisfactorily distributed but as the agents are not fixed in the wood the effect has decreased rather rapidly.

70 When the moisture content is high growth conditions for the rot will exist again. According to the recently introduced diffusion method, concentrated solutions of organotin compounds have been encased in glass ampoules and these have been inserted in the holes and crushed when the holes are plugged. Organotin compounds are not soluble in water and since they also have a very low vapour pressure there is some doubt that a satisfactory distribution will be obtained by this method.

80 It has now been found that a combination of steps comprising forming of cavities, applying a wood preservative and post-treating in the form of covering is an efficient way of treating wood of the kind previously mentioned, i.e. wood, exposed to fungal decay or already decayed, in existing constructions such as mounted window frames and jambs, and of protecting this wood for a long term and considerably lengthen its life-time. In this combination of steps not only the application of a wood preservative to the timber is taken into consideration but also that the condition for growth of rot, the moisture, is removed to the greatest possible extent and that the moisture is prevented from re-entering. This is achieved by leaving the formed cavities, after the application of the wood preservative, at least partly open so that they form channels through which the moisture is ventilated. To prevent moisture from re-entering to the greatest possible extent the treated parts are thereafter provided with a covering of sheet metal or of plastic.

The present invention thus relates to a method for protective treatment of timber in existing constructions which method comprises forming of cavities in the timber, applying a wood preservative to the timber through the cavities, leaving the cavities open and thereafter covering the treated parts with a moulding or a profile.

110 Joinery of different kinds in buildings can be treated according to the present method. The method is particularly intended to be used for in situ treatment of door and window joinery which, for varying reasons, e.g. due to lack of protection originally or due to poor protection, design, lack of repair etc., has been decayed or is exposed to decay. As has been mentioned, rot will not attack if the moisture content is kept low. Door and window joinery in buildings is exposed to moisture both from the inside air and the outdoor air and also from the building itself. Rain water is of great importance for moistening the wood and it has been found that rot damage in windows most frequently occurs in the lower horizontal members of the external casement or frame. Other parts which are exposed are the joints and the middle jamb as water penetration is facilitated at joints. It is thus most important to treat the external parts and all the steps of the present method can be

carried out from the outside of the building, if desired, but just as well from the inside.

In a first step cavities are formed at the attacked or exposed parts, or in the region of these. The number of holes and their positions are decided with respect to the conditions in each case. Holes are drilled to a diameter which of course is adjusted with respect to the thickness and the width of the parts to be treated. Compared with what is common it is preferred that more holes and holes of smaller dimensions are formed to get as efficient removal of moisture as possible. For window joinery the diameter is suitably between about 3 and about 10 mm. According to the present invention the holes shall not be plugged or sealed in other manner after the application of the wood preservative but they shall function as channels through which the moisture which has furthered the rot attack can migrate out from the wood. On account of this it is preferred that the holes are drilled at an oblique angle to the surface and directed towards the damaged parts. An angle of between 45 and 80° is suitable. The holes will hereby pass through a greater volume of wood than if it is drilled at a right angle to the surface and the "chimney-effect" will be amplified. On vertical surfaces the holes should be directed upwards to avoid formation of pockets wherein moisture can accumulate. The depth of the holes should of course also be adjusted with respect to the dimensions of the treated material and also with respect to the presence of heartwood in the timber.

In the next step a wood preservative is introduced in the wood through the formed cavities. Although the previously mentioned diffusion process can be used in some cases it is preferred to inject the preservative under pressure as this process is independent of the moisture content in the wood for distribution of the agent and also as it gives a simpler process with respect to the preferred angle of the holes. Use of pressure-injection also means that agents which are fixed to the wood and thus give a prolonged effect can be employed. Known oil-soluble wood preservatives e.g. organotin compounds such as tributyltin oxide can be used, for example dissolved in white spirit. However, it is particularly advantageous to use agents which are fixed in the wood and which are soluble or dispersible in water. Such agents are for example known combinations of fatty acid/metal/ammonia and the so-called AAC-agents (alkyl ammonium compounds) which during the last few years have been more extensively used for wood preservation. The AAC-compounds are amines, salts of amines and inorganic or organic acids, for example fatty acids, and quaternary ammonium compounds which contain at least one higher aliphatic hydrocarbon chain. These types of compounds are particularly advantageous since they are effective not only against rot but also against mould and sapstain. The nitrogen present in the compounds results in a good fixing in the wood. Another advantage is that these types of compounds do

not give rise to discoloration of the wood and that the vapour pressure of the compounds is negligible and irritating vapours are thus not given off. Compounds of the AAC-type can be used as such or in combination with other suitable fungicidal agents, e.g. thiourea and guanidated amines. Particularly good results have been obtained with combinations of quaternary ammonium compounds, e.g. benzalkonium chloride, and guanidated amines. Organic solvents, such as white spirit, can be used as carrier but this is generally not desirable. It is preferred that the agents are applied in the form of water solutions or water dispersions having the desired contents of the active substance. As it is desirable to supply as little water as possible to the wood the agents can advantageously be dissolved in lower volatile alcohols, e.g. ethanol and isopropanol; lower glycols, e.g. ethylene glycol, or mixtures of these or mixtures of these and water, instead of in water.

The wood preservative is injected into the wood by means of suitable pressure-injection apparatus. The time for treatment is suitably around about half a minute to a minute or a couple of minutes depending on the type of wood, the amount of heartwood and sapwood respectively, the condition of the wood etc. The injected amount is suitably followed by means of a flow meter connected to the impregnation equipment. The pressure is adjusted with respect to the particular conditions and should usually be within the range of 0.1 to 1.0 MPa. The upper limit is principally dependent on the condition of the wood.

After the injection the parts in question can if desired be brushed with a hydrophobing agent, e.g. paraffin wax or alkyd resins. The holes are not plugged but are left with communication to the environment to permit release of the moisture.

As the last step of the present method the parts which have been treated according to the above are covered with a moulding or a profile to prevent that moisture will anew enter the wood. It is possible to use covering with sheet metal, e.g. aluminium or lacquered plate covering. With respect to method of operation and also with respect to wood preservation it is preferred to use plastic profiles. These can easily be produced in desired shapes and colours, there are no problems concerning attachment and they do not require any finishing treatment. The mouldings can be designed to be very tight and to give a good covering of joints. They can be fastened by nailing or gluing or, if they are designed with gripping means, by pressing into grooves in the support. The profiles are fastened to the support in such a manner that an air gap is formed between these and the wood and the gap should suitably have a depth of 3 to 8 mm. A profiled-section in plastic material can replace painting and other post-treatment of the in situ treated parts. The profiles can be made from weather resistant and colour fast materials such as PVC and ABS.

The present invention thus offers a method for in situ treatment of timber against incipient or

threatening rot attacks in a very efficient manner which is cost-saving with respect to the input of work and wherein both the actual funicidal treatment with wood preservative and the removal  
5 and continued prevention of climatic factors which further the decay have been considered. A particularly favourable effect is obtained when a combination of the steps previously described as especially suitable are used, namely forming of  
10 holes at an angle and directed upwards, use of per se water soluble or water dispersible wood preservatives which are fixed in the wood, preferably wood preservatives containing compounds of the AAC-type, and covering with  
15 profiles of plastic material. Windows and other joinery parts which have been treated according to the present method will not require repair for a longer period of time.

In practical tests 10 windows which had been  
20 attacked by rot and which had a moisture content of between 27 and 44 per cent were treated. The treatment according to the invention comprised drilling of holes, application of a wood preservative based on quaternary ammonium  
25 compounds and guanidine derivatives by pressure injection and covering with plastic profiles in such a manner that an air gap of about 6 mm was formed. The treated windows were inspected after  
30 six months and the moisture content was then measured to between 14 and 19 per cent, i.e. it was in all cases clearly below the limit for growth of rot. The treatment according to the invention thus resulted in an efficient removal of moisture  
35 and also efficiently prevented re-entering of moisture.

#### CLAIMS

1. A method for protective treatment of timber in existing constructions, characterized in that cavities are formed in the construction, that a  
40 wood preservative is supplied to the timber through the cavities, that the holes are left open and that the so treated parts are covered with a moulding or a profile.

2. A method according to claim 1, characterized in that the cavities are formed at an oblique angle to the surface.

3. A method according to claim 1 or 2, characterized in that the cavities are directed upwards on vertical surfaces.

50 4. A method according to claim 1, characterized in that the wood preservative is injected under pressure.

5. A method according to claim 1 or 4, characterized in that the wood preservative is an agent which per se is water soluble and is fixed in the wood.  
55

6. A method according to claim 5, characterized in that the wood preservative is dissolved in a volatile lower alcohol or glycol.

60 7. A method according to claim 1, characterized in that the treated part is covered with a plastic profile.

8. A method for protective treatment of timber as claimed in claim 1, substantially as described  
65 herein.

9. Timber which has been subjected to a protective treatment by the method claimed in any one of the preceding claims.